

IN THE U.S. PATENT AND TRADEMARK OFFICE



Applicants : Miyoshi et al.

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For : SHAPED RESIN ARTICLE AND CONDUCTIVE RESIN COMPOSITION

Art Unit : 1796

Examiner : Ana Lucrecia Woodward

DECLARATION UNDER 37 C.F.R. 1.132

I, Takaaki Miyoshi, a Japanese citizen residing at 1711-2 Hitomi, Kimitsu-shi, Chiba-ken, Japan, declare and say:

I took a major in Industrial Chemistry at Kobe City College of Technology, and graduated therefrom in March 1987.

In April 1987, I entered Asahi Kasei Kogyo Kabushiki Kaisha (now, Asahi Kasei Kabushiki Kaisha), and have been engaged in the research and development of polymer alloys.

I am well familiar with the present case.

I read and understood the Office Action dated March 24, 2010 and references cited therein.

I have carried out experiments to evaluate the coating adhesion strengths of pellets of resin compositions which are varied with respect to the contents and ratio of the specific large molecules and small molecules of polyphenylene ether present in the pellets, i.e., relatively high molecular weight polyphenylene ether molecules (hereinafter "High Mw PPE") with a molecular weight of 200,000 or more, and rela-

tively low molecular weight polyphenylene ether molecules (hereinafter "Low Mw PPE") with a molecular weight of 5,000 or less. The experiments are described in a paper attached hereto and marked "Exhibit 1".

From Exhibit 1, it can be fairly concluded:

- (1) that, in Experiment 1 (present invention) where the PPE contained in the sample pellets satisfied all of the following requirements: (i) weight ratio of High Mw PPE/Low Mw PPE ≤ 0.35 , (ii) amount of Low Mw PPE ≤ 5 wt%, and (iii) amount of High Mw PPE ≤ 2 wt%, the pellets exhibited an extremely excellent coating adhesion strength, 100 %, which means that none of the 100 square coating sections were peeled off in the adhesion test described at page 86, line 9 to page 87, line 7 of the specification of the present application;
- (2) that, on the other hand, in Comparative Experiment 1 where only the requirement (ii) (Low Mw PPE ≤ 5 wt%) was not satisfied, the coating adhesion strength became as low as 53 %;
- (3) that, in Comparative Experiment 2 where the requirement (iii) (High Mw PPE ≤ 2 wt%) and the requirement (i) (High Mw PPE/Low Mw PPE ≤ 0.35) were not satisfied, the coating adhesion strength became as low as 89 %;
- (4) that, in Comparative Experiment 3 where only the requirement (i) (High Mw PPE/Low Mw PPE ≤ 0.35) was not satisfied, the coating adhesion strength became as low as 88 %; and
- (5) that, from items (1) to (4) above, it is apparent that the requirements (i) to (iii) concerning the amounts and ratio of Low Mw PPE and High Mw PPE are critical for achieving the excellent coating adhesion strength in the present invention.

The undersigned petitioner declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: Feb. 01, 2011

T. Miyoshi
Takaaki Miyoshi



Exhibit 1

Experiments to evaluate the coating adhesion strengths of pellets of resin compositions which are varied with respect to the contents and ratio of the specific high molecular weight molecules and low molecular weight molecules of polyphenylene ether present in the pellets

I. OBJECT OF THE EXPERIMENTS

Into claim 1 of the present application, the features of claims 7 and 8 have been introduced. Specifically, as to the polyphenylene ether (B) present in the shaped resin article of the present invention, amended claim 1 recites the presence of:

relatively high molecular weight polyphenylene ether molecules (hereinafter "High Mw PPE"), each independently having a molecular weight of 200,000 or more, and

relatively low molecular weight polyphenylene ether molecules (hereinafter "Low Mw PPE"), each independently having a molecular weight of 5,000 or less,

and, with respect to these High Mw PPE and Low Mw PPE, amended claim 1 recites the following requirements:

- (i) weight ratio of High Mw PPE/Low Mw PPE ≤ 0.35 ,
- (ii) amount of Low Mw PPE ≤ 5 wt%, and
- (iii) amount of High Mw PPE ≤ 2 wt%.

These requirements (i) to (iii) are critical for achieving the excellent coating adhesion strength of the shaped resin article of the present invention. In order to substantiate this, experiments were made as follows.

II. Methods and Materials:

Experiment 1 (present invention: reproduction of Example 8 of the present application)

Example 8 of the present application (page 95 to 96 of the specification of the present application) was repeated except that the extruder was changed from "ZSK-70MC" to "ZSK-26MC". These extruders are both co-rotating intermeshing extruders and are substantially the same in structure except that the screw diameters are different. All of the materials used in Experiment 1 are the same as those used in Example 8 except for the difference of lot numbers.

Further, the evaluations of various properties including the preparation of the samples were carried out in the same manner as in the Examples and Comparative Examples of the present application (page 81, line 19 to page 88, line 8 of the specification of the present application).

Comparative Experiments 1 to 3 (Prior Art)

Each of Comparative Experiments 1 to 3 were carried out in substantially the same manner as in Experiment 1 above except that the types of the PPE materials used and the manner of addition of the PPE materials were changed as shown in Table A below.

Further, the evaluations of various properties were carried out in the same manner as in Experiment 1 above.

III. Results

Conditions and results of Experiment 1 and Comparative Experiments 1 to 3 are summarized and shown in the following Table A.

Table A

			Comp. Ex. 1	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3
Upstream inlet						
Feeder 1	PPE-1 (parts by weight)	*1	38		38	20
	PPE-2 (parts by weight)	*2		38		18
Feeder 2	MAH (parts by weight)	*4	0.3	0.3	0.1	0.2
Feeder 3	SEBS1 (C-1) (parts by weight)	*5	12	12	12	12
1st downstream inlet						
Feeder 4	PA66-a (parts by weight)	*7	30	30	30	30
	PA6 (parts by weight)	*7'	20	20	20	20
2nd downstream inlet						
Feeder 5	Wollastonite 1 (parts by weight)	*14	20	20	20	20
Polyamide area ratio ($\geq 80\%$ in claim 1)						
PPE with a molecular weight of 5,000 or less ($\leq 5\text{wt\%}$ in claim 1)		%	85	81	82	90
PPE with a molecular weight of 200,000 or more ($\leq 2\text{wt\%}$ in claim 1)		%	4.6	6.1	3.8	3.8
PPE with a molecular weight of 200,000 or more / PPE with a molecular weight of 5,000 or less (≤ 0.35 in claim 1)		%	1.5	0.8	2.3	1.6
PPE with a molecular weight of 200,000 or more / PPE with a molecular weight of 5,000 or less (≤ 0.35 in claim 1)			0.33	0.13	0.61	0.42
Coating adhesion strength		%	100	53	89	88
Sharpness of an image		—	A	A	B	A
Matteness of the coated surface		—	III	II	III	II

*1) PPE powder having a reduced viscosity of 0.52 dl/g

*2) PPE powder having a reduced viscosity of 0.42 dl/g

*4) Maleic anhydride (in the form of tablets)

*5) SEBS block copolymer (styrene content: 33 %; Mn: 246,000)

*7) PA6,6 viscosity number: 120 ml/g; $[\text{NH}_2] = 2.5 \times 10^5 \text{ mol/g}$;
 $[\text{COOH}] = 11.6 \times 10^5 \text{ mol/g}$

*7') PA6 "1013B" (trade name; manufactured and sold by Ube Industries, Ltd., Japan)

*14) Wollastonite (average particle diameter: 5 μm , aspect ratio: 13)

IV. Conclusion:

From the above, it can be fairly concluded as follows.

In Experiment 1 (present invention), the PPE contained in the sample pellets satisfied all of the following requirements: (i) weight ratio of High Mw PPE/Low Mw PPE ≤ 0.35 , (ii) amount of Low Mw PPE ≤ 5 wt%, and (iii) amount of High Mw PPE ≤ 2 wt%. As a result, the pellets exhibited an extremely excellent coating adhesion strength, 100 %, which means that none of the 100 square coating sections were peeled off in the adhesion test described at page 86, line 9 to page 87, line 7 of the specification of the present application.

On the other hand, in Comparative Experiment 1, only the requirement (ii) (Low Mw PPE ≤ 5 wt%) was not satisfied. As a result, the coating adhesion strength became as low as 53 %.

In Comparative Experiment 2, the requirement (iii) (High Mw PPE ≤ 2 wt%) and the requirement (i) (High Mw PPE/Low Mw PPE ≤ 0.35) were not satisfied. As a result, the coating adhesion strength became as low as 89 %.

In Comparative Experiment 3, only the requirement (i) (High Mw PPE/Low Mw PPE ≤ 0.35) was not satisfied. As a result, the coating adhesion strength became as low as 88 % (which means that, even when the amounts of both of High Mw PPE and Low Mw PPE are small and satisfy the requirements (ii) and (iii), the excellent coating adhesion strength cannot be achieved unless the ratio of these molecules satisfies the requirement (i), i.e., within the range (≤ 0.35) recited in claim 1 of the present application).

From the above, it is apparent that the requirements (i) to (iii) concerning the amounts and ratio of low Mw PPE and high Mw PPE are critical for achieving the excellent coating adhesion strength in the present invention.